Appl. No. 09/749,332
Reply to Final Office Action of July 6, 2005

Docket No. MIT-070PUS

Amendments to the Claims:

This listing of the claims will replace all prior versions, and listings, of the claims in the application:

1. Cancelled.

1 2. (Currently Amended) The method of claim 11↲, wherein the step of forming a plurality of
2 clusters further comprises the steps of:
3   advertising an availability of each of said plurality of cluster-heads; and
4   establishing a communication path between each of said plurality of cluster-heads and at
5 least one of the plurality of nodes, not operating as a cluster-head, to form a cluster.

1 3. (Previously Presented) The method of claim 2 wherein the step of establishing a
2 communication path between the cluster-head and each of the at least one of the plurality of
3 nodes comprises the steps of:
4   transmitting a status signal from each one of said plurality of cluster-heads;
5   receiving at each of the plurality of nodes one or more of the status signals;
6   comparing, at each of the plurality of nodes, not operating as a cluster-head, signal
7   strengths of the received one or more status signals; and
8   joining a particular one of the cluster-head's cluster as a result of the comparison.

1 4. (Previously Presented) The method of claim 3, wherein the step of joining a particular cluster
2 is based on a determination, by at least one of the plurality of nodes, of the cluster-head
3 transmitting the status signal having a highest received signal strength.

1 5. (Original) The method of claim 2 further comprising the steps of:
2   generating at the cluster-head, a schedule having allotted slots for transmission;
3   transmitting data from at least one node to the cluster-head during the allotted slots;

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4   receiving data in the cluster-head that are transmitted from at least one node; and

5   transmitting data from the cluster-head to the base station.

1   6. (Original) The method of claim 5, wherein the step of receiving data in the cluster-head

2   further comprises the step of reducing data transmission latency by using application-specific

3   data aggregation to reduce the amount of redundant data sent to the base station.

1   7. (Original) The method of claim 5, wherein the step of receiving data in the cluster-head

2   further comprises the step of increasing the signal to noise ratio of the data sent to the base

3   station by using application-specific data aggregation.

1   8. (Original) The method of claim 5, wherein the step of generating a schedule uses a time

2   division multiplexing protocol.

1   9. (Original) The method of claim 5, further comprising the step of beamforming the data

2   received from the plurality of nodes in the cluster.

10. Cancelled

1   11. (Currently Amended) A~~The~~ method of ~~claim 10,~~ forming a network from a plurality of

2   nodes and a base station, the method comprising the steps of:

3   (a) identifying at least one node of the plurality of nodes to operate as a cluster-head including

4   randomly selecting one of the plurality of nodes to be a cluster-head;

5   (b) forming a plurality of clusters from the plurality of nodes, each of the clusters having at least

6   one cluster-head;

7   (c) transmitting data from at least one node in at least one of the plurality of clusters to the

8   cluster-head in that cluster;

9   (d) transmitting data from at least one cluster-head to the base station; and

10   (e) identifying a different one of the plurality of nodes to operate as a cluster-head, wherein the

11   step of randomly selecting one of the plurality of nodes to be a cluster-head is based on a

12   probabilistic function of an amount of energy remaining in each of the plurality of nodes.

1   12. (Currently Amended) The method of claim 11̶1̶, wherein the step of forming a plurality of

2   clusters further comprises the steps of:

3   collecting data on a status of each of the plurality of nodes;

4   assigning each of the plurality of nodes to a particular one of a plurality of clusters.

13. Cancelled.

14. Cancelled.

1   15. (Currently Amended) The method of claim 18̶1̶4̶ wherein the step of electing a plurality of

2   cluster-heads is performed by the base station.

1   16. (Previously Presented) The method of claim 15 wherein the base station elects cluster-heads

2   by minimizing an energy required during the first round of data transmission.

1   17. (Currently Amended) The method of claim 18̶1̶4̶ wherein:

2   during the first round of data transmission, each of the at least one node in each cluster

3   transmits data to the cluster-head of that cluster; and

4   each cluster-head transmits data to the base station during the first transmission round.

1   18. (Currently Amended) A method o̶f̶ c̶l̶a̶i̶m̶ 1̶4̶ for forming a network from a base station and a

2   plurality of nodes, the method f̶u̶r̶t̶h̶e̶r̶ comprising the steps of:

3   electing a cluster-head from the plurality of nodes;

4   establishing a communication path between first ones of the plurality of nodes and the

5   cluster-head to form a cluster;

6   establishing a first round of data transmission;

7   transmitting from the first ones of the plurality of nodes to the cluster-head during the

8   first data transmission round; and

9   transmitting data from the cluster-head to the base station during the first data transmission

10   round.

11   establishing a second round of data transmission;

12   determining whether each node of the plurality of nodes has operated as a cluster-head;

13   electing a second set of cluster-heads wherein each node in the second set of cluster-

14   heads has never before been a cluster-head; and

15   forming a second set of clusters about the second set of cluster-heads;

16   electing a plurality of cluster-heads corresponding to a first set of cluster-heads for use

17   during the first round of data transmission; and

18   establishing a communication path between each of the plurality of cluster-heads and at

19   least one node of the plurality of nodes to form a first plurality of clusters..

1   19. (Currently Amended) The method of claim 18 14 further comprising the steps of:

2   in each of a second set of clusters;

3   transmitting data from each node in the second set of clusters to the respective cluster

4   heads; and

5   transmitting data from each of the second set of cluster-heads to the base station.

1   20. (Currently Amended) A The method of claim 14 further for forming a network from a base

2   station and a plurality of nodes, the method comprising the steps of :

3   electing a cluster-head from the plurality of nodes;

4   establishing a communication path between first ones of the plurality of nodes and the

5   cluster-head to form a cluster;

6   establishing a first round of data transmission;

7   transmitting from the first ones of the plurality of nodes to the cluster-head during the

8   first data transmission round;

9   transmitting data from the cluster-head to the base station during the first data

10   transmission round;

1   establishing a second round of data transmission;

2   determining an amount of energy remaining in each node of the plurality of nodes;

3   electing a second set of cluster-heads, wherein the election is based on the amount of

4   energy remaining in each node of the plurality of nodes; ~~and~~

5   forming a second set of clusters about the second set of cluster-heads;

6   electing a plurality of cluster-heads corresponding to a first set of cluster-heads for use

7   during the first round of data transmission; and

8   establishing a communication path between each of the plurality of cluster-heads and at

9   least one node of the plurality of nodes to form a first plurality of clusters.

21. Cancelled.

1   22. (Currently Amended) The network according to claim 26~~21~~, wherein each of the plurality of

2   nodes is in electrical communication with a sensor.

1   23. (Currently Amended) The network according to claim 26~~21~~, wherein each of said plurality

2   of nodes further comprises a sleep mode.

1   24. (Currently Amended) The network according to claim 26~~21~~, wherein each of said plurality

2   of nodes further comprises an adjustable transmission energy level.

1   25. (Currently Amended) The network according to claim 26~~21~~, wherein each of said plurality

2   of nodes further comprises a low energy mode, and a high energy mode.

1   26. (Currently Amended) A~~The~~ network ~~according to claim 21~~comprising:

2   a base station; and

3   a plurality of nodes comprising:

4   a cluster-head selector processor; and

5   a cluster selector processor, each cluster comprised of a subset of said plurality of

6   nodes, and one of each of said subset of said plurality of nodes temporarily acting as a cluster-

7   head, wherein each of said plurality of nodes has a limited amount of remaining energy; and

8   wherein the cluster-head selector processor selects each of said plurality of nodes as a

9   cluster-head based on the limited amount of remaining energy in each of said plurality of nodes

10   and a number of times each of said plurality of nodes has operated as a cluster head.

1   27. (Currently Amended) The network according to claim 26 21, wherein each of said plurality

2   of nodes further comprises a signal strength processor.

1   28. (Original) The network according to claim 27, wherein the cluster selector processor

2   determines the cluster selection in response to a signal from the signal strength processor.

1   29. (Currently Amended) The network according to claim 26 21, wherein the base station selects

2   each of said plurality of nodes to temporarily act as a cluster-head.

1   30. (Currently Amended) The network according to claim 26 21, wherein the base station

2   determines which of each of said plurality of nodes is included in each temporary cluster.